

Docket No. 217774US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Makoto KATO, et al.
SERIAL NO: 10/026,627
FILED: December 27, 2001
FOR: RESIN COMPOSITION MATERIAL

GAU: 1713
EXAMINER:

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INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR 1.97

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Applicant(s) wish to disclose the following information.

REFERENCES

- The applicant(s) wish to make of record the references listed on the attached form PTO-1449. Copies of the listed references are attached, where required, as are either statements of relevancy or any readily available English translations of pertinent portions of any non-English language references.
- A check is attached in the amount required under 37 CFR §1.17(p).

RELATED CASES

- Attached is a list of applicant's pending application(s) or issued patent(s) which may be related to the present application. A copy of the patent(s), together with a copy of the claims and drawings of the pending application(s) is attached along with PTO 1449.
- A check is attached in the amount required under 37 CFR §1.17(p).

CERTIFICATION

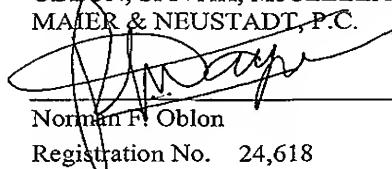
- Each item of information contained in this information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement.
- No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application or, to the knowledge of the undersigned, having made reasonable inquiry, was known to any individual designated in 37 CFR §1.56(c) more than three months prior to the filing of this statement.

DEPOSIT ACCOUNT

- Please charge any additional fees for the papers being filed herewith and for which no check is enclosed herewith, or credit any overpayment to deposit account number 15-0030. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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SHEET 1 OF 1

Form PTO 1449 (Modified)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTY DOCKET NO. 217774US0X	SERIAL NO. 10/026,627		
LIST OF REFERENCES CITED BY APPLICANT				APPLICANT Makoto KATO, et al.	RECEIVED FEB 28 2003 GROUP 1700		
				FILING DATE December 27, 2001	GROUP 1713		
U.S. PATENT DOCUMENTS							
EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUB CLASS	FILING DATE IF APPROPRIATE
	AA	5,973,053	10/26/99	USUKI, et al.			
	AB	5,936,023	08/10/99	KATO, et al.			
	AC	6,121,361	09/19/00	USUKI, et al.			
	AD	6,103,817	08/15/00	USUKI, et al.			
	AE	6,472,460	10/29/02	OKAMOTO, et al.			
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FOREIGN PATENT DOCUMENTS							
		DOCUMENT NUMBER	DATE	COUNTRY	TRANSLATION YES NO		
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	AV						
OTHER REFERENCES (Including Author, Title, Date, Pertinent Pages, etc.)							
	AW						
	AX						
	AY						
	AZ	<input type="checkbox"/> Additional References sheet(s) attached					
Examiner				Date Considered			

*Examiner: Initial if reference is considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



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LIST OF RELATED CASES

<u>Docket Number</u>	<u>Serial or Patent Number</u>	<u>Filing or Issue Date</u>	<u>Inventor/Applicant</u>
0068-0290-0	5,973,053	10/26/99	USUKI, et al.
0068-0316-0X	5,936,023	08/10/99	KATO, et al.
0068-0366-0 DIV	6,121,361	09/19/00	USUKI, et al.
0068-0367-0X DIV	6,103,817	08/15/00	USUKI, et al.
0068-0394-0 PCT	6,472,460	10/29/02	OKAMOTO, et al.
223707US0	10/155,999	05/29/02	PENDING
217774US0X*	10/026,627	12/27/01	PENDING

*Present Application; listed for information

WHAT IS CLAIMED IS:

1. A process for producing a polymer/filler composite material comprising:

5 forming a mixture of a flake-like filler and a polymer material,

wherein the mean area (L^2), mean thickness (d) and volume fraction (c) of said flake-like filler in said mixture satisfy the following equations (1), (2) and (3):

10 $500 \text{ nm}^2 \leq L^2 \leq 100 \mu\text{m}^2$ (1)

$d \leq L/20$ (2)

$0.2 d/L \leq c \leq 4 d/L$ (3),

and applying deformation to said mixture at a strain rate of no greater than 10 s^{-1} .

15 2. A process for producing a polymer/filler composite material according to claim 1, wherein said deformation is accomplished by stretching.

20 3. A process for producing a polymer/filler composite material according to claim 1, wherein said deformation is accomplished by foaming.

4. A process for producing a polymer/filler composite material according to claim 1, wherein said flake-like filler is derived from a layered clay mineral.

25 5. A process for producing a polymer/filler composite material according to claim 2, wherein said

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Related Pending Application
Related Case Serial No: 10155,999
Related Case Filing Date: 05/29/02

flake-like filler is derived from a layered clay mineral.

6. A process for producing a polymer/filler composite material according to claim 3, wherein said
5 flake-like filler is derived from a layered clay mineral.

7. A process for producing a polymer/filler composite material according to claim 1, wherein at
10 least a portion of said polymer material is a polymer material with a polar group.

8. A process for producing a polymer/filler composite material according to claim 2, wherein at least a portion of said polymer material is a polymer material with a polar group.

15 9. A process for producing a polymer/filler composite material according to claim 3, wherein at least a portion of said polymer material is a polymer material with a polar group.

20 10. A process for producing a polymer/filler composite material according to claim 4, wherein at least a portion of said polymer material is a polymer material with a polar group.

25 11. A process for producing a polymer/filler composite material according to claim 5, wherein at least a portion of said polymer material is a polymer material with a polar group.

12. A process for producing a polymer/filler composite material according to claim 6, wherein at least a portion of said polymer material is a polymer material with a polar group.

ABSTRACT OF THE DISCLOSURE

A process for producing a polymer/filler composite material includes a mixture forming step in which there is obtained a mixture of a flake-like filler and a 5 polymer material, and the mean area (L^2), mean thickness (d) and volume fraction (c) of the flake-like filler in the mixture satisfy the following equations (1), (2) and (3):

$$500 \text{ nm}^2 \leq L^2 \leq 100 \text{ } \mu\text{m}^2 \quad (1)$$

10 $d \leq L/20 \quad (2)$

$$0.2 \frac{d}{L} \leq c \leq 4 \frac{d}{L} \quad (3),$$

and a deforming step of applying deformation to the mixture at a strain rate of no greater than 10 s^{-1} .

Fig.1

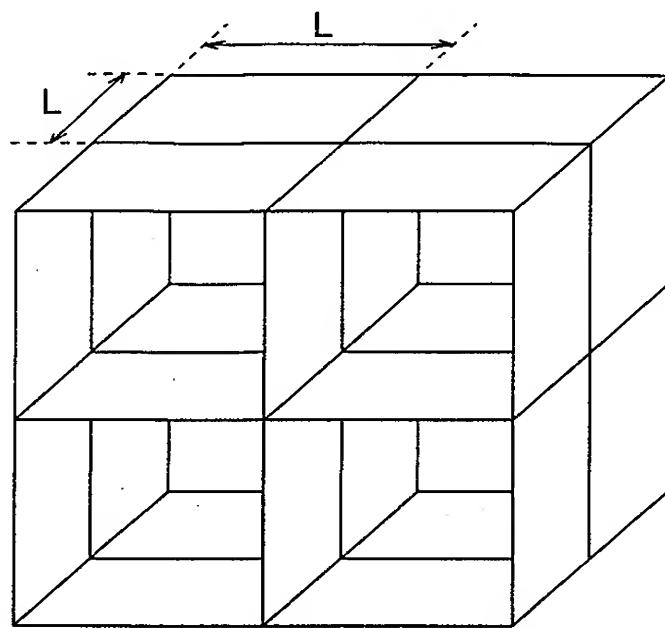


Fig.2

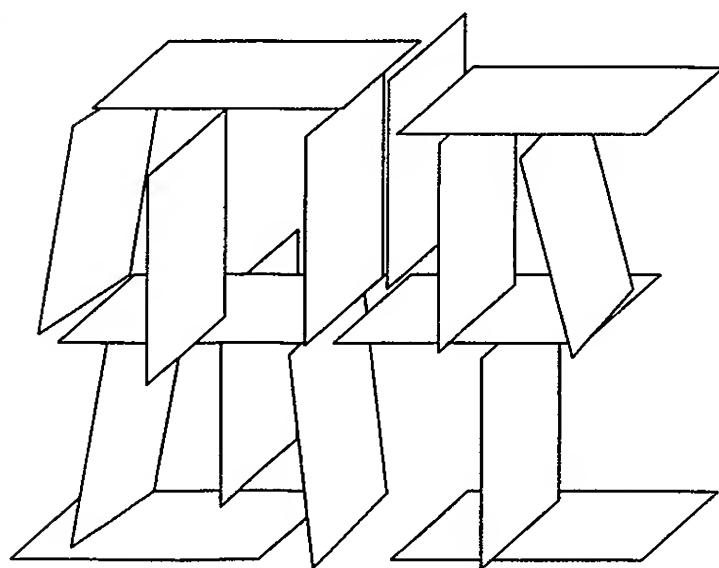
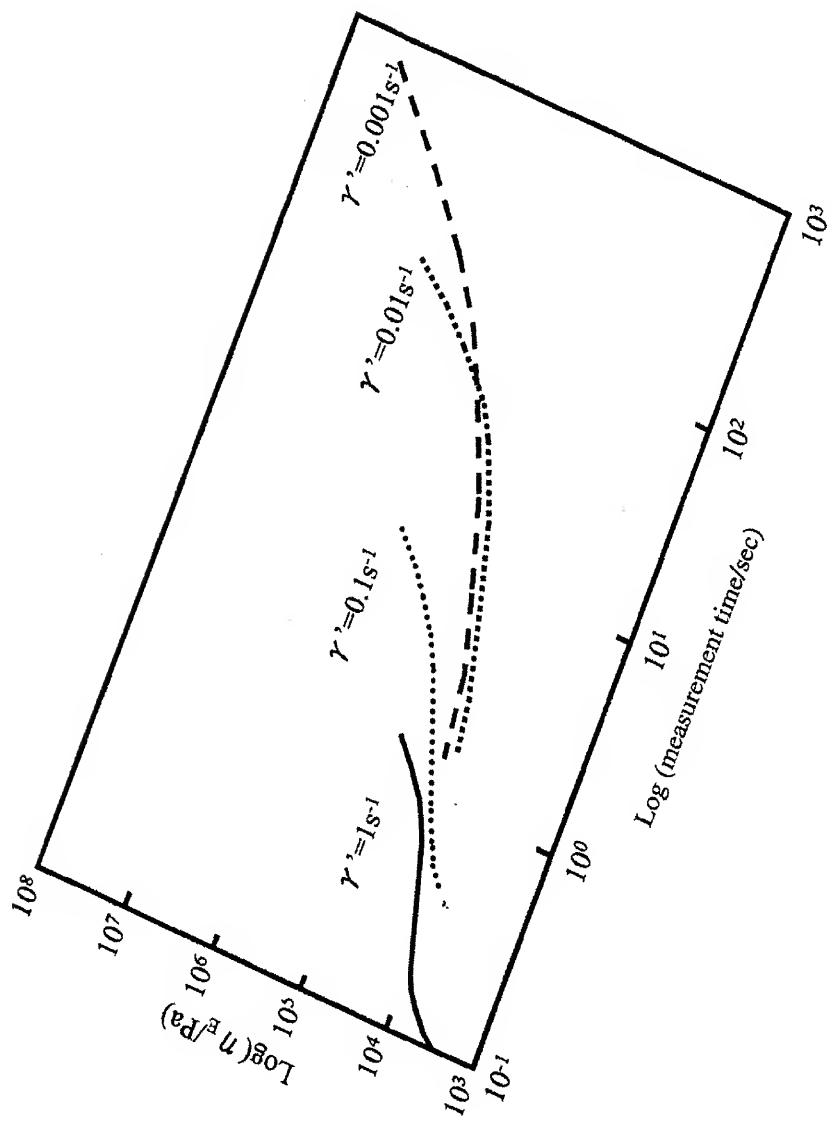


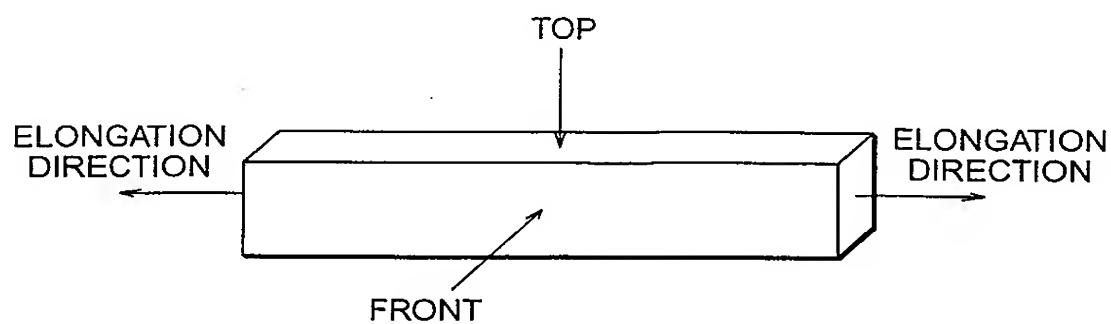
Fig.3



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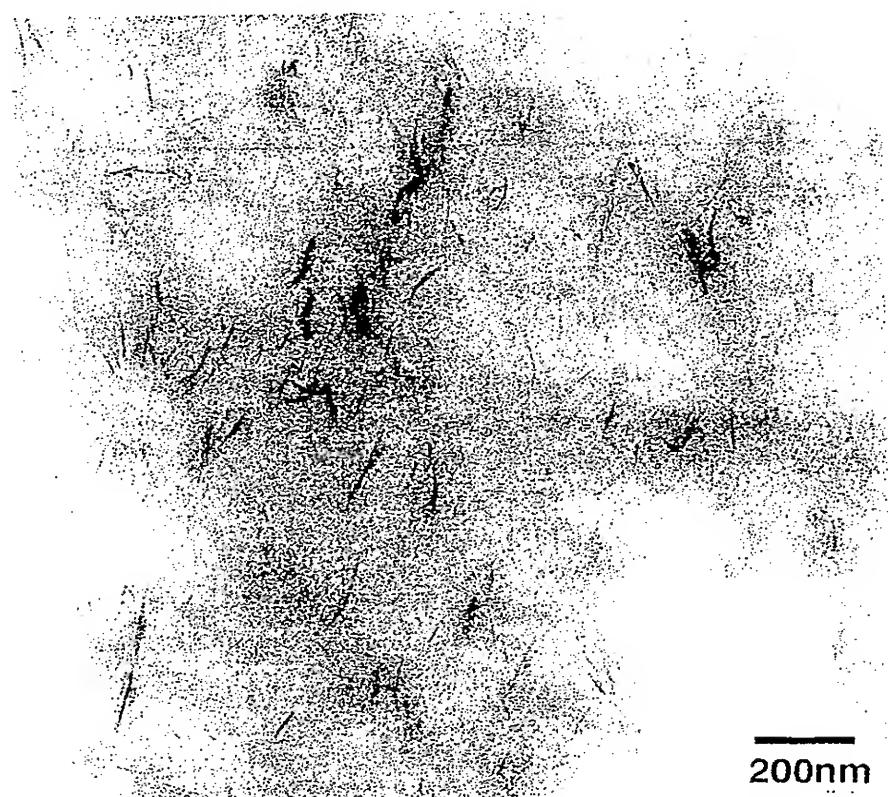
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Fig.4



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Fig.5



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Fig. 6

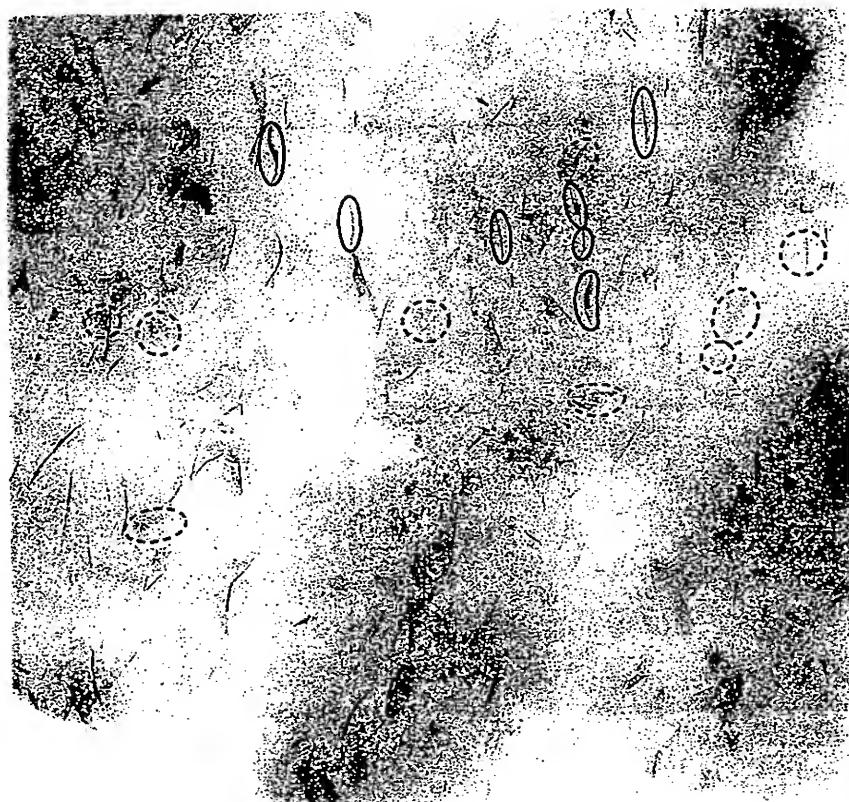
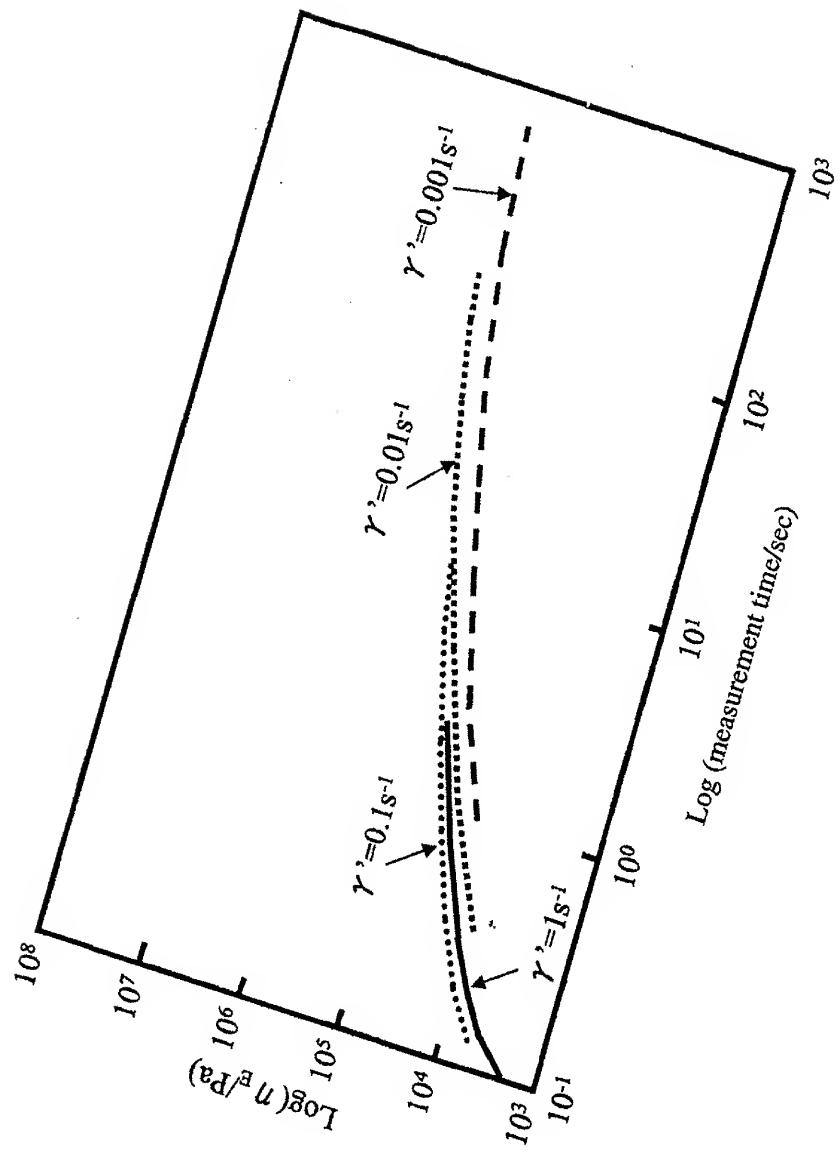


Fig.7



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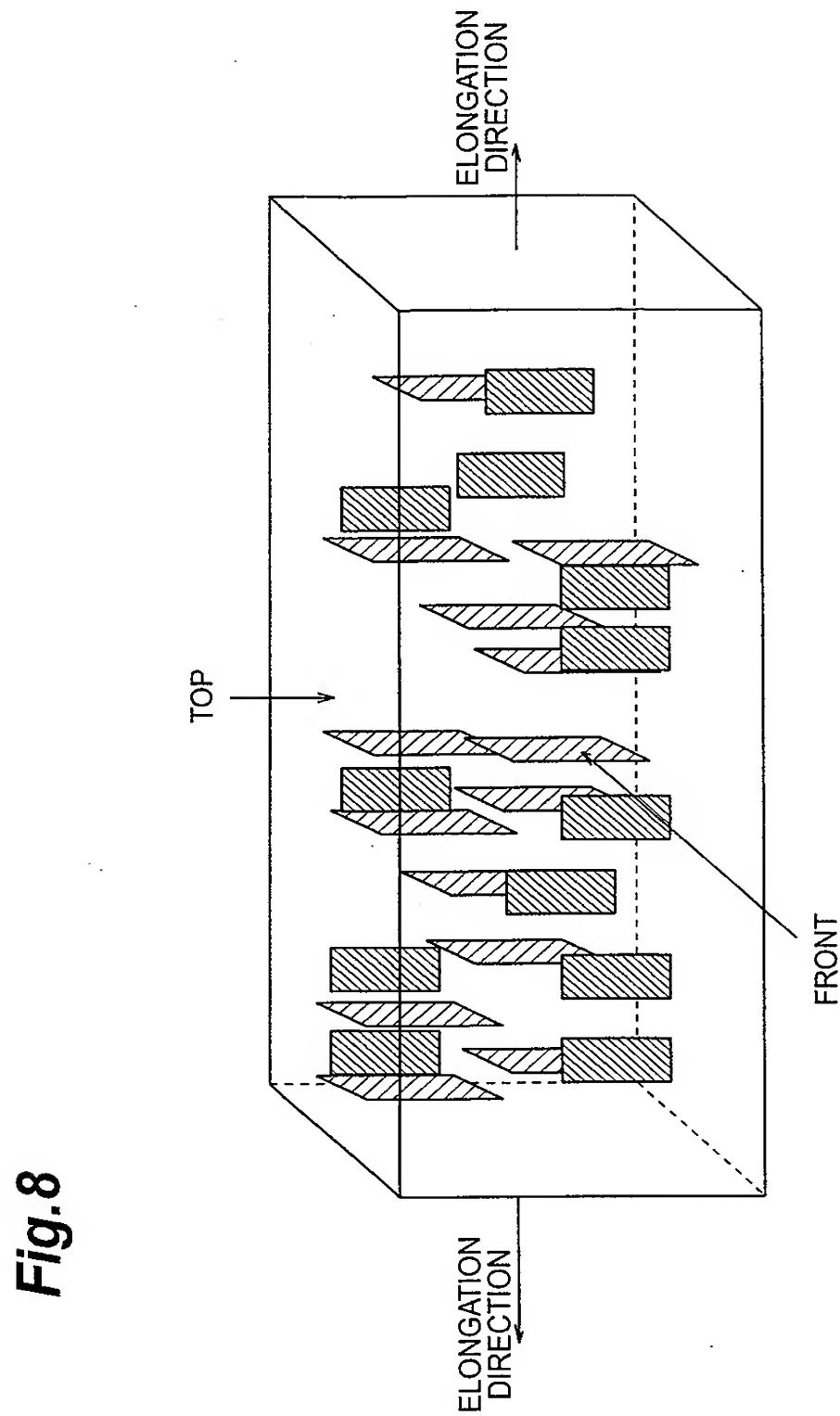


Fig.8

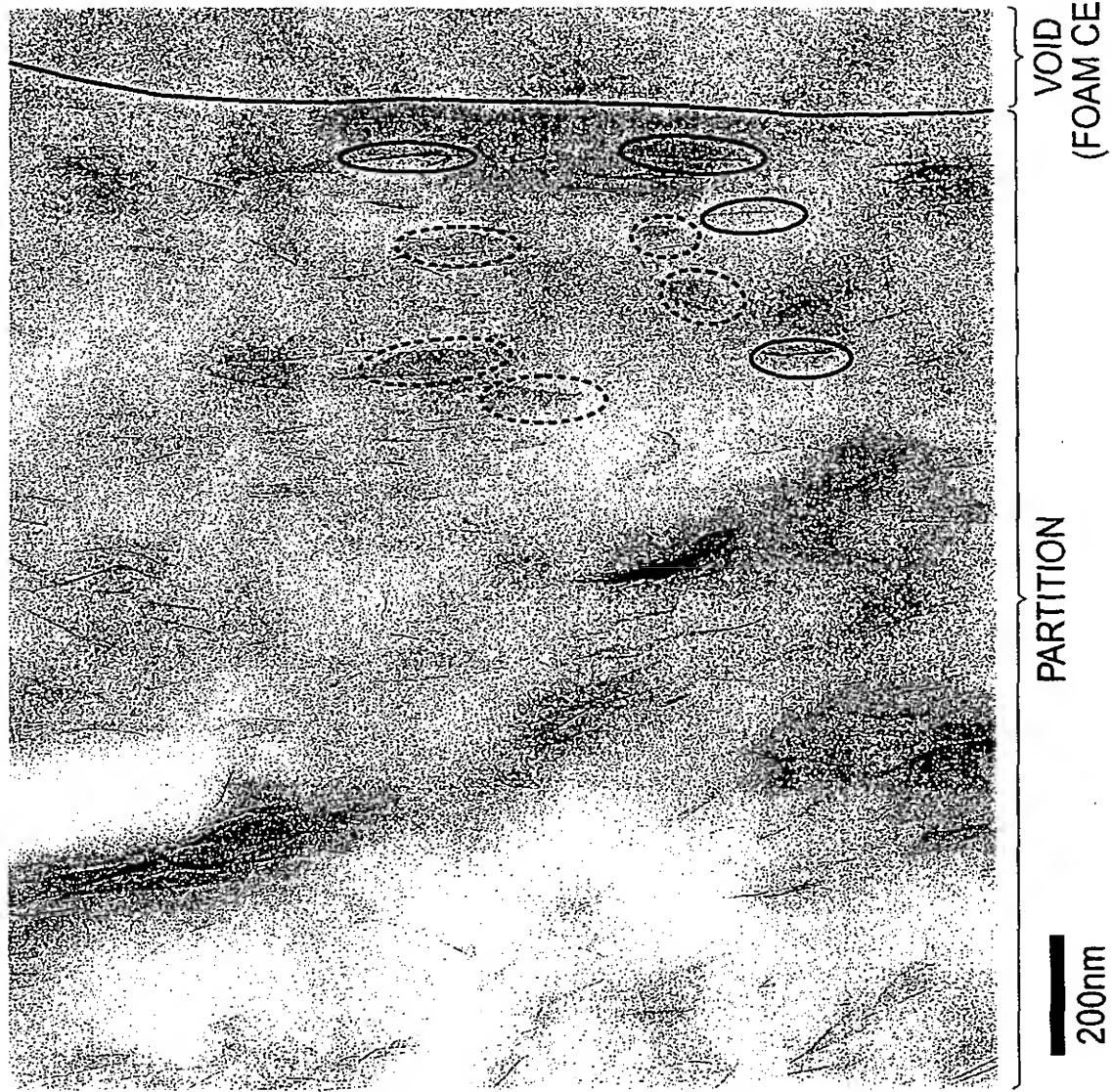
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Fig.9



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Fig. 10



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Fig.11

